Drifting Buoys Provide Valuable Data As Hurricane Frances Approaches Florida

As Hurricane Frances approached the southeast coast of Florida, scientists and technicians from Scripps Institution of Oceanography (SIO), the University of Washington (UW), and the Atlantic Oceanographic and Meteorological Laboratory (AOML), anxiously waited while drifting buoys that they had readied to monitor surface conditions before, during, and after the storm were deployed by the 53rd Hurricane Hunter Squadron out of Keesler Air Force Base in Biloxi, Mississippi. Drifting buoys are used to collect important data to augment P-3 aircraft data and satellite imagery data, thus providing additional detail about the characteristics of the ocean surface. Forecasters at the National Hurricane Center (NHC) rely on a multitude of observations to determine the hurricane's strength, movement, and eventual path along with the potential for intensification or weakening.

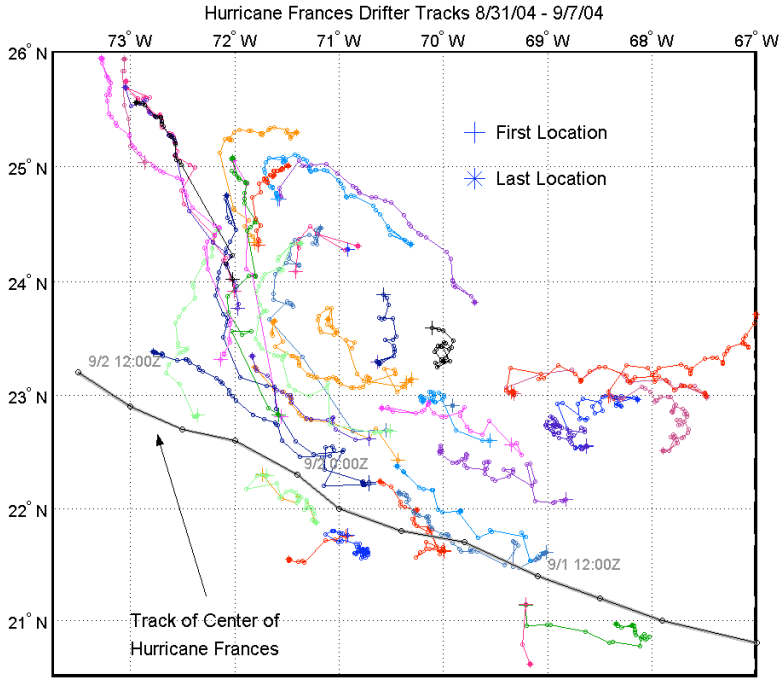
In early September 2003, an array of 16 drifting buoys, funded by NOAA's Office of Global Programs (OGP) and the Office of Naval Research (ONR) as part of the global ocean observing system, were deployed and provided valuable information as Hurricane Fabian approached the eastern United States. This year, NOAA's OGP and the ONR again sponsored the deployment of 39 drifters in advance of Hurricane Frances; 37 survived the passing of the storm.

With the drifters held at Keesler Air Force Base in anticipation of a suitable storm, observations of Frances were made for several days with some question as to whether the hurricane was moving too quickly for a viable deployment. Some of the instruments require ample time to collect their data. Eventually Frances slowed and the decision was made to deploy. On August 31 the drifters were dropped by two C-130 aircraft flying from the Keesler Base. They were deployed about 24 hours ahead of the storm to allow the instruments time to measure near normal sea state before the hurricane passed over.

Four types of drifters were used to monitor surface conditions. Fourteen Minimet drifters measured sea surface temperature, atmospheric pressure, location, wind speed and wind direction; eight Autonomous Drifting Ocean Stations (ADOS) drifters measured sea surface temperature, atmospheric pressure, location, wind speed, wind direction, upwelling and downwelling, light, and water temperature via a 100 m long chain hanging below; fourteen SVP drifters with a drogue hanging at 100 m measured sea surface temperature and location; and three SVP drifters with a drogue hanging at 15 m measured sea surface temperature, atmospheric pressure, and location.

Pressure and sea surface temperature data from the deployed drifters were transferred to the Global Telecommunications System (GTS) by Mayra Pazos of the Atlantic Oceanographic and Meteorological Laboratory (AOML), where ocean data are made available in near real-time for scientific use. Eric Blake, of the National Hurricane Center (NHC) in Miami, stated that information from these drifters, such as the wind radii, water temperatures, and pressure helped provide a view of the conditions in advance of Hurricane Frances. The data were used to help diagnose the conditions during the storm and to narrow the area where hurricane watches and warnings were

forecast. "More data means better forecasts," said Blake. Along with satellite imagery and data from the P-3 planes, drifters provide information to give coastal communities more advance notice of an approaching storm. Researchers should soon be able to evaluate how effective the additional drifter data were to help with storm prediction.



A plot of the drifter tracks path of Hurricane Frances for 24 hours from September 1-2, 2004. Hurricane Frances was a category 4 hurricane when it passed over the drifting buoys. The drifter track plot shows that the hurricane passed a little farther to the southwest than expected and hit the side of the array. Because of this, some of the asymmetries in the hurricane were missed, but the data were still useful.

This picture was taken the day the drifters were being shipped to Keesler Air Force Base in Biloxi, Mississippi. By August 18 all of the researchers – Peter Niiler and Eric Terrill from Scripps Institution of Oceanography, and Eric D'Asaro and Tom Sanford from the University of Washington – had these and other instruments at Keesler Air Force Base ready for deployment.

This picture was taken last year during testing of the air deployment drifter packages.

Contributed by Diane Stanitski, NOAA Office of Global Programs, Office of Climate Observation, with drifter information provided by Bill Scuba, Scripps Institution of Oceanography.